

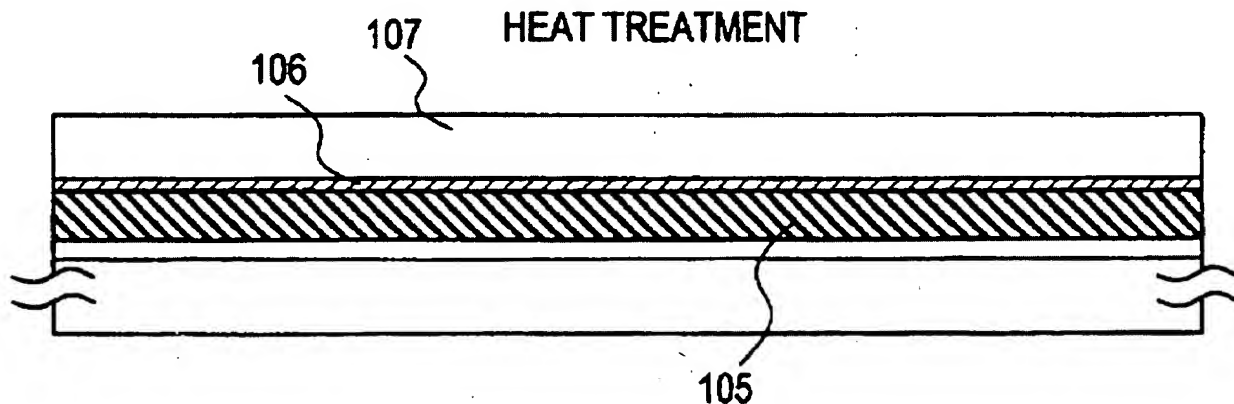
As stated in MPEP §§ 2142-2143.01, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

The prior art, either alone or in combination, does not teach or suggest all the features of the independent claims. Independent claims 1, 10, 22, 30 and 41 recite among other features, a process for producing a semiconductor device including (1) forming a first semiconductor film having a crystal structure by adding an element for promoting crystallization, (2) forming a second semiconductor film over the first semiconductor film, in which the second semiconductor film includes a rare gas element or the rare gas element is added to the second semiconductor film, (3) second heat treatment to segregate the element for promoting crystallization into the second semiconductor film; and (4) removing the second semiconductor film. By performing the above process, especially steps (3) and (4), the element for promoting crystallization is removed from the semiconductor device. These features improve the characteristics for the semiconductor device since a defect level caused by the element for promoting

crystallization is not generated (see, e.g., page 5, line 6, through page 7, line 10 of the present specification). For the reasons provided below, Yamazaki '284 and Henley, either alone or in combination, do not teach or suggest the above-referenced features of the present invention.

The Official Action relies on crystalline silicon film 105, silicon oxide film 106 and amorphous silicon film 107 to allegedly teach the first semiconductor film, barrier layer and second semiconductor film, respectively, of the claims of the present application (see, e.g., Figure 3C, reproduced below).

FIG.1C



The Official Action concedes that Yamazaki '284 does not teach "forming a second semiconductor film containing a rare gas element or, adding a rare gas element to the second semiconductor film ... wherein the rare gas element is added by any one of ion implantation and ion doping ... wherein the rare gas element is one or more selected from He, Ne, Ar, Kr and Xe" (pages 4-5, Paper No. 1205). The Official Action asserts that Henley teaches "a polycrystalline silicon layer or an amorphous silicon layer may be used as a gettering layer [where] noble gas ions are implanted into the layer, and an annealing method is performed" (page 5, Id.). However, even if these teachings are combined, the resulting combination does not result in the method as claimed in the present independent claims. Henley teaches a polysilicon layer 612 as a gettering site

provided beneath an active layer (a thin film of monocrystalline silicon 618) (see, e.g., Figure 6E, reproduced below).

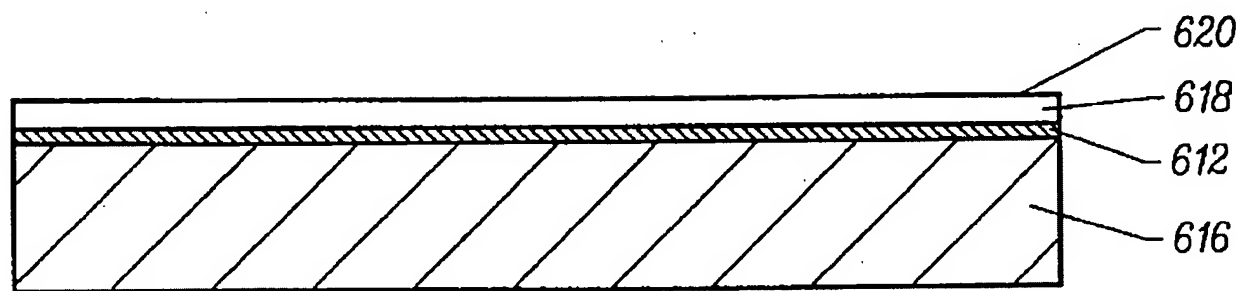


FIG. 6E

However, Henley does not teach or suggest removing polysilicon layer 612, which might contain an element such as metal. In other words, the combination of Yamazaki '294 and Henley does not teach or suggest that an element such as metal is removed from the device by removing polysilicon layer 612 or that polysilicon layer 612 of Henley should be used in lieu of amorphous silicon film 107 of Yamazaki '284.

Even if one were motivated to combine Yamazaki '284 with Henley, at best, one might be motivated to insert a layer such as polysilicon layer 612 of Henley underneath crystalline silicon film 105 of Yamazaki '284; however, this combination does not result in the present invention, because layer 612 is not intended to be removed.

The Official Action has not shown why it would have been obvious to use Henley's polysilicon layer 612, which is provided beneath an active layer (a thin film of monocrystalline silicon 618) and which is not removed, in lieu of the amorphous silicon film 107 of Yamazaki '284, which is provided over an active layer and is later removed. Therefore, Yamazaki '284 and Henley do not teach or suggest a second heat treatment to segregate an element for promoting crystallization into a second semiconductor film; and removing the second semiconductor film.

Since Yamazaki '284 and Henley do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained. Accordingly, reconsideration

and withdrawal of the rejections under 35 U.S.C. § 103(a) are in order and respectfully requested.

Furthermore, there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Yamazaki '284 and Henley or to combine reference teachings to achieve the claimed invention. MPEP § 2142 states that the examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. It is respectfully submitted that the Official Action has failed to carry this burden. While the Official Action relies on various teachings of the cited prior art to disclose aspects of the claimed invention and asserts that these aspects could be modified in the manner asserted in the Official Action, it is submitted that the Official Action does not adequately set forth why one of skill in the art would combine the references to achieve the features of the present invention.

The test for obviousness is not whether the references "could have been" combined or modified as asserted in the Official Action, but rather whether the references should have been. As noted in MPEP § 2143.01, "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990) (emphasis in original). Thus, it is respectfully submitted that the standard set forth in the Official Action is improper to support a finding of *prima facie* obviousness.

The Official Action asserts that "[it] would have been obvious to one of ordinary skill in the art to incorporate [the features of Yamazaki '284 and Henley] ... for the purpose of removing the impurities for example, metals ... from the first semiconductor film" (page 5, Paper No. 1205). The Applicants respectfully disagree and traverse the above assertions in the Official Action.

It appears that the Official Action is asserting that it would have been obvious to remove impurities from the crystalline silicon film 105 of Yamazaki '284 by somehow

incorporating Henley's polysilicon layer 612 into Yamazaki '284. Presumably, in order to render obvious the claims of the present application, the Official Action would have to show that it would have been obvious to combine Henley's polysilicon layer 612, which is not removed and which is located below an active layer of the device, with amorphous silicon film 107 of Yamazaki '284, which is removed and is located over an active layer of the device. In other words, since polysilicon layer 612 of Henley is intended to be a permanent part of the completed Henley device, it is not clear why one of ordinary skill in the art would have been motivated to replace Yamazaki's amorphous silicon film 107 with Henley's polysilicon layer 612.

Further, it is not sufficient to merely point out the advantages of two references and assert that it would have been obvious to combine the two references so that you can have both advantages in one device. Rather, in order to form a *prima facie* case of obviousness, the Official Action must show why the references should have been combined.

Therefore, the Applicant respectfully submits that the Official Action has not provided a proper or sufficient suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Yamazaki '284 and Henley or to combine reference teachings to achieve the claimed invention.

In the present application, it is respectfully submitted that the prior art of record, either alone or in combination, does not expressly or impliedly suggest the claimed invention and the Official Action has not presented a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.

For the reasons stated above, the Official Action has not formed a proper *prima facie* case of obviousness. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are in order and respectfully requested.

The Official Action rejects claims 13, 15, 32 and 34 as obvious based on the combination of Yamazaki '284, Henley and U.S. Patent No. 6,291,888 to Bhat et al.

Please incorporate the arguments above with respect to the deficiencies in Yamazaki '284 and Henley. Bhat does not cure the deficiencies in Yamazaki '284 and Henley. The Official Action relies on Bhat to allegedly teach the features of dependent claims 13, 15, 32 and 34. Specifically, the Official Action relies on Bhat to teach the use of ozone water or ozone. However, Yamazaki '284 and Henley and Bhat, either alone or in combination, do not teach or suggest a second heat treatment to segregate an element for promoting crystallization into a second semiconductor film; and removing the second semiconductor film or that it would have been obvious to use Henley's polysilicon layer 612 in lieu of the amorphous silicon film 107 of Yamazaki '284. Since Yamazaki '284, Henley and Bhat do not teach or suggest all the claim limitations and since there is insufficient motivation to combine Yamazaki '284, Henley and Bhat, a *prima facie* case of obviousness cannot be maintained. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are in order and respectfully requested.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,



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